

Remarks

Claims 1-20 were pending in the subject application. By this Amendment, Applicants have amended the title of the application such that it is more clearly indicative of the invention to which the claims are directed. Claims 1, 15, and 20 have been amended, support for which can be found throughout the specification including page 2, lines 13-31; page 5, lines 1-9; and Example 5, and claim 16 has been canceled. New claims 21-38 have been added, support for which can be found on, for example, page 2, lines 5-31; page 5, lines 16-17; page 6, Tables 1-2, page 7, Table 3; and page 8, lines 5-17. Thus, claims 1-15 and 17-38 are presently before the examiner.

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of U.S. Patent No. 6,087,543 (hereinafter the '543 patent) and U.S. Patent No. 6,166,273 (hereinafter the '273 patent). Applicants respectfully traverse this ground of rejection. The '543 patent is directed to a method of synthesizing fluorinated benzene from chlorobenzene and a metal fluoride composition at process temperatures from 175 °C to 450 °C. The '273 patent is directed to a method of synthesizing fluorinated benzenes and pyridines from benzenes and pyridines and a metal fluoride composition at process temperature between 250 °C and 550 °C.

As an initial matter, Applicants submit that the cited combination of references fails to raise a *prima facie* case of obviousness because there is no motivation to combine the cited references nor is there a reasonable expectation of success in arriving at the presently claimed invention in view of the teachings of the references. The basis for combinability as articulated by the Federal Circuit includes "some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination" (*In re Octiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992)). The Office Action indicates that motivation to combine the two references lies in higher temperature processes taught in the '273 patent. However, the high temperature processes of the '273 patent fail to realize a high yield. In fact, the high temperature processes of the '273 patent result in yields lower than those in the '543 patent. Thus, a skilled artisan would lack motivation to combine the references because modifying the processes of the '543 patent with the teachings of the '273 patent would not result in improved yields of monofluorobenzene.

Therefore, a skilled artisan reading the '543 patent in view of the '273 patent would not have had a reasonable expectation of successfully producing monofluorobenzene at temperatures such as those recited within the claims. Applicants also respectfully submit that one skilled in the art would not have had a reasonable expectation of synthesizing monofluorobenzene in view of the teachings of the cited references. As noted above, the high temperature processes of the '273 patent fail to realize a high yield. In fact, the high temperature processes of the '273 patent result in yields lower than those in the '543 patent.

The Office Action also indicates that motivation lies in applying the processes of the '543 patent to a broader class of starting materials. Applicants respectfully disagree with the asserted motivation. As noted above, the methods of the '273 patent result in low yields of fluorobenzene, even at high process temperatures. These low yields do not suggest that utilizing benzenes and pyridines in addition to chlorobenzenes would result in an improved synthesis. In contrast, the skilled artisan would likely conclude that broadening the aromatic reactants of the '543 patent to include non-chlorinated aromatics would yield a significant loss of product.

Moreover, even if the cited references are properly combinable, the claimed methods demonstrate unexpected results and superior yields over the processes of the cited references. The Federal Circuit has expressed the importance of secondary evidence, including unexpected results, in refuting obvious rejections.

[E]vidence of secondary considerations may often be the most probative and cogent evidence in the record. It may often establish that an invention appearing to have been obvious in light of prior art was not. It is to be considered as part of all the evidence, not just when the decisionmaker remains in doubt after reviewing the art.

Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538-39 (Fed. Cir. 1983).

The methods of the claimed invention show a superior yield of monofluoroaromatics over the methods of the cited references. Evidence of surprisingly superior yields produced from aromatics is provided in Tables 1 and 2 on page 6 of the specification. The claimed methods produce yields of monofluorinated compounds higher than the conversions of the '273 patent regardless of the temperature or the ratio of the fluorinating agents and supports. The applicants submit that the '273

patent provides a method that barely converts benzene to fluorobenzene, as shown in its Table 1 (column 3), at temperatures even higher than that of the claimed methods. The '273's highest yield is merely 15% at a temperature of 550°C (see Table 2). In contrast, Table 2 in the subject application illustrates that the claimed methods produced higher yields (23.8% to 63.1%) at temperatures far less than 550°C.

Furthermore, as illustrated in Table 3 (page 7), the claimed methods also efficiently produce superior conversion percentages even over time. The smallest conversion to fluorobenzene in a spent bed is still more than double the highest conversion shown in the '273 patent (15%) (see Table 1).

Similarly, when the starting reagent is a chloroaromatic, the claimed methods still show superior conversion rates as compared to the conversion rates of the '543 patent. Example 3 (at pages 8-9) illustrates that the conversion rates are far superior to those in the cited references. For example, Table 6 shows that at 450°C, the fluorobenzene conversion rate of the claimed methods is over 10% higher than the methods of the '543 patent.

Applicants further note the yield of monofluorinated benzene decreases as the temperature is increased above 400°C in the '543 patent. As illustrated in Table 2, the yield of monofluorinated benzene peaks at a temperature of 400°C and decreases from 39% to 29% at a temperature of 450°C. Thus, the subject invention produces unexpectedly superior yields of monofluorobenzene as compared to the '543 patent.

Thus, Applicants submit that these unexpectedly superior results render the claimed invention unobvious over the cited references; accordingly, Applicants request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection.

In view of the foregoing remarks and amendments to the claims, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

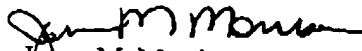
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The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



Jenna M. Morrison

Patent Attorney

Registration No. 55,468

Phone No.: 352-375-8100

Fax No.: 352-372-5800

Address: Saliwanchik, Lloyd & Saliwanchik
A Professional Association
P.O. Box 142950
Gainesville, FL 32614-2950

JMM/ssa